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U. S. Nat. Herb. 3 : 225. It is apparently common in northern Idaho and adjacent Washington and, although found in various collections, has always been referred to the very different *R. oxyacanthoides*, which seems to be confined to the eastern part of the continent.

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Reviews.

*Flora of the Amboy Clays.** After many vexatious delays the Flora of the Amboy Clays has appeared. It makes a handsome quarto volume, uniform with other U. S. Geological Survey Monographs, of 260 pages and 58 plates. Its distinguished author was one of the fathers of American paleobotany and it is much to be regretted that he could not have lived to see the publication of his valuable material. But it was not to be, and it is fortunate, indeed, that so able an editor was found to carry on the book to its completion. It will stand as a monument to the painstaking discrimination and acumen of the one and the careful judgment of the other.

The so-called Amboy Clays take their name from Perth Amboy and South Amboy, in New Jersey, and embrace some 350 feet of clays, usually of much commercial importance, that are there best exposed. As a formation, however, the Amboy Clays extend from northeastern Maryland diagonally across the State of New Jersey, the southern portion of Staten Island and the north shore of Long Island to the southern counties of Massachusetts. These clays have furnished the rich flora, which is the subject of the present monograph.

Biologically speaking the Amboy Clay flora is of much interest. It consists of 156 species, of which just 100 are described as new to science, besides a number of more or less doubtful fragments. The most striking feature of the flora is the great

* *Flora of the Amboy Clays.* By John Strong Newberry. A posthumous work, edited by Arthur Hollick. Monographs U. S. Geol. Surv. Vol. 26: Wash., Government Printing Office, 1895 (1896). pp. 260. *pl.* 58.

preponderance of phanerogams, there being only 10 species not belonging to this class. This approaches somewhat closely to the proportions existing in the present between the higher cryptogams and the dominant types, and suggests at once the comparative modernness of the Amboy flora.

Of the 10 cryptogams enumerated, one is regarded as an alga, one as an hepatic, and the remainder are ferns, one of the most interesting being an undoubted *Ophioglossum*. The Cycadaceae are represented by 3 genera and 5 species, and the Coniferae by 15 genera and 19 species. No monocotyledons were obtained. The angiospermous dicotyledons are represented as follows: Juglandaceae, 1 genus and species; Myricaceae, 1 genus and 7 species; Salicaceae, 2 genera and 5 species; Fagaceae, 1 genus and species; Ulmaceae, 1 genus and species; Moraceae, 1 genus and 3 species; Proteaceae, 2 genera and 3 species; Magnoliaceae 3 genera, 11 species, of which the remarkable *Liriodendropsis* is described as new; Menispermaceae, 1 genus, 2 species; Lauraceae, 4 genera, 8 species; Rosaceae, 1 genus and species; Leguminosae, 7 genera and 10 species; Aquifoliaceae, 1 genus and species; Celastraceae, 2 genera, 11 species; Aceraceae, 1 genus and species; Rhamnaceae, 2 genera and 2 species; Vitaceae, 1 genus, 2 species; Tiliaceae and Passifloraceae each with 1 genus and species; Myrtaceae, 1 genus, 5 species; Araliaceae, 3 genera, 12 species; Cornaceae, 1 genus and species; Ericaceae, 1 genus, 4 species; Myrsinaceae, 1 genus, 3 species; Sapotaceae, Ebenaceae, Asclepiadaceae and Caprifoliaceae each with a single genus and species; uncertain affinities, 8 genera and 19 species.

This brief enumeration brings out clearly the great diversity of the flora, for there are not less than 30 well marked modern families represented, and often with a goodly number of species. It seems unreasonable to suppose that this complex dicotyledonous flora should be anywhere near the actual beginning of this great class of plants, as has recently been suggested. It must have had a long period of development before such diversity could have been attained.

From the geological side this work furnishes a valuable and timely contribution to the controversy regarding the presence of Jurassic strata along the Atlantic border. The Amboy Clays are

shown to be higher than the Potomac of Virginia, and to have strong affinities with the Dakota group, the Atam and Patoot beds of Greenland, the Cretaceous clays of Aachen, Germany, and the upper Cretaceous rocks of Bohemia. The geological position and the abundant angiospermous flora furnish a complete refutation of the contention that the Amboy Clays can belong to the Jurassic.

The task of editing a posthumous work is always a delicate one, since the editor is in constant fear of not correctly interpreting the author. In this respect Mr. Hollick seems to have been very judicious, and has made only such changes in the original manuscript as were necessary on account of discoveries made or publications issued subsequent to the time when the author ceased active work. These changes are presented in the form of footnotes over the editor's initials; the work, therefore, is essentially Dr. Newberry's.

The plates, in point of mechanical finish, are unquestionably the best that have thus far been made of this class of objects by the Geological Survey. The printing is also of good quality, but it is unfortunate that the book should be marred by an incorrect date of issue. It appears from the letter of transmittal that it was submitted in March, 1894. It bears on the title page the date of 1895, whereas it was only issued in the last days of 1896.

F. H. K.

Spermatozoids in Phanerogams. The leading articles in recent numbers* of the *Botanisches Centralblatt* are contributed by two Japanese botanists, Prof. S. Ikeno, of the University at Tokio, and Dr. S. Hirase, of the same institution. In these two rather brief papers is announced a discovery of great interest to the botanical world—that of spermatozoids in *Ginko biloba* and *Cycas revoluta*. If confirmed, this will prove one of the most significant additions to the comparative morphology of the higher plants that has been made since the time of Hofmeister.

While more details are promised in papers that are to follow, enough is given in these preliminary contributions to inspire a good degree of confidence. In *Ginko biloba*, according to Dr. Hirase, a

**Botanisches Centralblatt*, 69: 1-3; 33-35. 1897.

pollen-tube is formed, which penetrates the ovule, but does not come in contact with the archegonium. The nucleus of the pollen-tube divides, parallel to the long axis of the tube, into two daughter nuclei, one of which continues to grow and divides again into two in a similar way. The latter two daughter-cells become the ciliated motile male gametes. These spermatozoids are described as exhibiting a nucleus completely surrounded by cytoplasm. They are of an ovoid form, $82\ \mu$ long by $49\ \mu$ broad; the head consists of three spiral turns, these bearing numerous cilia, and a pointed tail is also present. As soon as the spermatozoids escape from the pollen-tube into a fluid which by this time has accumulated in the nucleus, they swim quite actively about with whirling movements.

The writer does not state that he has traced out the course of events from this time on. Prof. Ikeno has found in *Cycas revoluta* spermatozoids similar in structure and development to those of *Ginkgo*, but has not seen them in motion, as his observations were confined to material collected at a distance and treated with various fixing reagents.

MARSHALL A. HOWE.

Contributions towards a Monograph of the Laboulbeniaceae. By Roland Thaxter. *Memoirs Am. Acad.* 12: 187-429. *pl.* 1-26. D. 1896.

This is one of the most elaborate works that has yet appeared on American mycology and has set a pace that it will be difficult for many to follow. The author has been peculiarly fortunate in having before him an almost open field, since, of the 158 species known, 130 are American and with one or two exceptions have been described by the author himself; he has, moreover, described several of the exotic species. It is a privilege that few can enjoy to enter a field so free from the necessity, to borrow an expression from a colleague, "of first clearing the Augean stable of synonymy." The limits of species and genera have thus been a new problem and the group is fortunate in thus having its outlines marked by a skilled investigator. Besides the careful diagnoses of genera and species, there are twenty-six plates that are as nearly perfect as the art both of the author and of the engraver can make them; these illustrate all the species described. The author also gives some general discussion of the group and brings out more fully than in his former papers the two most important

features of the group: (1) that they are true ascomycetes, and (2) that they possess a sexual method of reproduction. The group is an obscure one, its members living parasitic on insects and having a simple structure and microscopic size, but inconspicuous as the group is, it is likely to throw much light on the origin and relations of some of the higher fungi, and is certain, at least, to throw doubt on the Brefeldian conclusions regarding the origin of the ascomycetes. American botany is indebted to the author for his laborious work on this unknown group of fungi and for his elaborate monograph.

L. M. U.

Ferns and Fern Allies of New England. By Raynal Dodge. Pp. 52. Binghamton, N. Y., Willard N. Clute & Co. 1896.

This little handbook, which can be slipped into the pocket, will be a convenient companion for fern-hunters in the region which it covers. It also indicates a renewal of interest in the popular study of these plants which, in the past twenty years, has been of much service in bringing to light the fuller knowledge of their distribution and variation. Two species of *Isoetes* are described, and a series of field notes on these plants is included; these are timely, since this obscure group, more than any other, is in need (1) of careful and extended observation in the field, and (2) careful study under variation of water supply with special reference to its influence on the development of structures that have been used hitherto in classification, and (3) of comparative study in anatomical structures and their illustration. To none who have made greater or less contributions to the knowledge of this group in America has this possibility of the study of fresh material been possible, and there is much to be gained by those to whom the opportunity is open to study habits as well as comparative structures. If this booklet succeeds in stimulating this sort of observation it will have done a good work.

L. M. U.

Proceedings of the Club.

WEDNESDAY EVENING, JANUARY 27, 1897.

In the absence of the President, Vice-President Rusby occupied the chair. There were twenty-one persons present.